

WHAT IS CLAIMED IS:

336/229

1. An electromagnetic device comprising:
an electrically conductive core having an inner diameter defining an opening
5 therethrough and an outer diameter, the core having sharp edges extending
circumferentially around the inner diameter and around the outer diameter thereof;
a plurality of polymeric protection members wrapped circumferentially around
the core and positioned adjacent the sharp edges of the core;
an adhesive layer between the protection members and the core connecting the
10 protection members to the core; and
a coated wire wrapped around the core so as to be magnetically coupled
thereto and around the polymeric protection members so as to be displaced from the
sharp edges of the core.
- 15 2. The device of Claim 1 wherein the protection members comprise L-
shaped strips having a short leg positioned adjacent an end of the core and a long leg
positioned adjacent a circumferential face of the core, wherein the short leg has a
length selected to provide a substantially flat surface on the end of the core.
- 20 3. The device of Claim 2 wherein the outer diameter of the core is at least
about 5 centimeters and wherein the length of the short leg is less than about .32
centimeters.
4. The device of Claim 2 wherein the outer diameter of the core is at least
25 about 22 centimeters and wherein the length of the short leg is less than about 1
centimeters.
5. The device of Claim 2 wherein the adhesive layer is positioned
adjacent the short leg of the protection members.
- 30 6. The device of Claim 5 wherein the long leg of the protection members
directly contacts the core without an adhesive layer therebetween.

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7. The device of Claim 1 wherein ones of the protection members further comprise a first end and a second end thereof, the first end and second end defining mating angles at an overlapping region of the protection members when the protection members are wrapped around the core so as to extend around the entirety of one of the sharp edges of the core without a bump discontinuity at the overlapping region.

8. The device of Claim 7 wherein the mating angles are between about 15 degrees and about 75 degrees.

10 9. The device of Claim 1 wherein the protection members comprise channel shaped members having a width at least equal to a width of the core and a first and second leg at opposite sides thereof and a channel portion extending therebetween, the channel shaped members being wrapped around the core so as to position the first leg adjacent a first end of the core and the second leg adjacent an opposite end of the core with a circumferential face of the core positioned in the channel shaped member.

10. The device of Claim 9 wherein the outer diameter of the core is at least about 5 centimeters and wherein the first and second leg each have a length of less than about .32 centimeters.

20 11. The device of Claim 9 wherein the outer diameter of the core is at least about 22 centimeters and wherein the first and second leg each have a length of less than about 1 centimeter.

25 12. The device of Claim 9 wherein the adhesive layer is positioned adjacent the first and second leg of the protection members.

13. The device of Claim 12 wherein the channel portion of the protection members directly contacts the core without an adhesive layer therebetween.

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14. The device of Claim 1 wherein the protection members comprise a crosslinked polymeric material having a dielectric strength selected to limit breakdown of the protection members by magnetic fields generated around the core.

15. The device of Claim 1 wherein the dielectric strength is at least about 200 volts/centimeter.

5 16. The device of Claim 1 wherein the polymeric material is stable at 150 degrees Centigrade for at least about 100 hours.

17. The device of Claim 1 wherein the crosslinked polymeric material comprises either medium or high density polyethylene.

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18. An electromagnetic device comprising:
an electrically conductive core having an inner diameter defining an opening therethrough and an outer diameter, the core having sharp edges extending circumferentially around the inner diameter and around the outer diameter thereof;
15 a plurality of polymeric protection members wrapped circumferentially around the core and positioned adjacent the sharp edges of the core, ones of the protection members having at least one short leg positioned adjacent at least one end of the core, wherein the short leg has a length selected to provide a substantially flat surface on the end of the core when the protection members are wrapped around the core; and
20 a coated wire wrapped around the core so as to be magnetically coupled thereto and around the polymeric protection members so as to be displaced from the sharp edges of the core.

25 19. The device of Claim 18 wherein the protection members comprise a crosslinked polymeric material having a dielectric strength selected to limit breakdown of the protection members by magnetic fields generated around the core.

30 20. The device of Claim 19 wherein the dielectric strength is at least about 200 volts/centimeter.

21. The device of Claim 19 wherein the polymeric material is stable at 150 degrees Centigrade for at least about 100 hours.

22. The device of Claim 19 wherein the crosslinked polymeric material comprises either medium or high density polyethylene.

23. The device of Claim 18 wherein the protection members comprise L-shaped strips having the at least one short leg positioned adjacent an end of the core and a long leg extending substantially transversely from the short leg and positioned adjacent a circumferential face of the core.

24. The device of Claim 18 wherein ones of the protection members further comprise a first end and a second end thereof, the first end and second end defining mating angles at an overlapping region of the protection members when the protection members are wrapped around the core so as to extend around the entirety of one of the sharp edges of the core without a bump discontinuity at the overlapping region.

25. The device of Claim 24 wherein the mating angles are between about 15 degrees and about 75 degrees.

26. The device of Claim 18 wherein the at least one short leg comprises a first leg and a second leg and the protection members comprise channel shaped members having a width at least equal to a width of the core and wherein the first and second leg are at opposite sides thereof with a channel portion extending therebetween, the channel shaped members being wrapped around the core so as to position the first leg adjacent a first end of the core and the second leg adjacent an opposite end of the core with a circumferential face of the core positioned in the channel shaped member.

27. The device of Claim 18 wherein the outer diameter of the core is at least about 5 centimeters and wherein the at least one short leg has a length of less than about .32 centimeters.

28. The device of Claim 18 wherein the outer diameter of the core is at least about 22 centimeters and wherein the at least one short leg each has a length of less than about 1 centimeters.

29. A protection member for a device including a sharp-edged core and an elongate member wrapped therearound, the protection member comprising an L-shaped strip having a short leg configured to be positioned adjacent an end of the core, abutting a circumferentially extending sharp edge of the core, and a long leg extending substantially transversely from the short leg so as to be positioned adjacent a circumferential face of the core, wherein the short leg has a length selected to provide a substantially flat surface on the end of the core when wrapped around the core.

30. The device of Claim 29 wherein the outer diameter of the core is at least about 5 centimeters and wherein the at least one short leg has a length of less than about .32 centimeters.

31. The device of Claim 29 wherein the outer diameter of the core is at least about 22 centimeters and wherein the at least one short leg each has a length of less than about 1 centimeters.

32. The device of Claim 29 wherein an adhesive layer is positioned adjacent an inner surface of the short leg.

33. The device of Claim 29 wherein the protection member comprises a crosslinked polymeric material having a dielectric strength selected to limit breakdown of the protection member by magnetic fields generated around the core.

34. The device of Claim 33 wherein the dielectric strength is at least about 200 volts/centimeter.

35. The device of Claim 33 wherein the polymeric material is stable at 150 degrees Centigrade for at least about 100 hours.

36. The device of Claim 33 wherein the crosslinked polymeric material comprises either medium or high density polyethylene.

37. The device of Claim 29 wherein the device comprises an electromagnetic device and wherein the elongate members comprise wires having an insulating coating thereon.

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38. The device of Claim 29 wherein the protection member further comprises a first end and a second end thereof, the first end and second end defining mating angles at an overlapping region of the protection member when the protection member is wrapped around the core so as to extend around the entirety of the sharp edge of the core without a bump discontinuity at the overlapping region.

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39. The device of Claim 38 wherein the mating angles are between about 15 degrees and about 75 degrees.

40. A protection member for a device including a sharp-edged core and an elongate member wrapped therearound, the protection member comprising channel shaped members having a width at least equal to a width of the core and a first and second leg at opposite sides thereof and a channel portion extending therebetween, the channel shaped members being configured to be wrapped around the core so as to position the first leg adjacent a first end of the core and the second leg adjacent an opposite end of the core with a circumferential face of the core positioned in the channel shaped member, wherein the first and second legs each have a length selected to provide a substantially flat surface on the end of the core when wrapped around the core.

41. The device of Claim 40 wherein the outer diameter of the core is at least about 5 centimeters and wherein the at least one short leg has a length of less than about .32 centimeters.

42. The device of Claim 40 wherein the outer diameter of the core is at least about 22 centimeters and wherein the at least one short leg each has a length of less than about 1 centimeter.

43. The device of Claim 40 wherein an adhesive layer is positioned adjacent the first and second leg of the protection member.

44. The device of Claim 40 wherein the protection member comprises a crosslinked polymeric material having a dielectric strength selected to limit breakdown of the protection member by magnetic fields generated around the core.

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45. The device of Claim 44 wherein the dielectric strength is at least about 200 volts/centimeter.

46. The device of Claim 44 wherein the polymeric material is stable at 150 degrees Centigrade for at least about 100 hours.

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47. The device of Claim 44 wherein the crosslinked polymeric material comprises either medium or high density polyethylene.

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48. The device of Claim 44 wherein the device comprises an electromagnetic device and wherein the elongate member comprises a wire having an insulating coating thereon.

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49. The device of Claim 40 wherein the protection member further comprises a first end and a second end thereof, the first end and second end defining mating angles at an overlapping region of the protection member when the protection member is wrapped around the core so as to extend around the entirety of the sharp edge of the core without a bump discontinuity at the overlapping region.

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50. The device of Claim 49 wherein the mating angles are between about 15 degrees and about 75 degrees.

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51. A method for assembling an electromagnetic device including a sharp-edged core and at least one wire wrapped therearound, the method comprising:
placing polymeric protection members around sharp edges of the core extending circumferentially around an inner diameter and around an outer diameter of the core, ones of the protection members having at least one short leg positioned adjacent at least one end of the core, wherein the short leg has a length selected to

provide a substantially flat surface on the end of the core when the protection members are wrapped around the core; and

5 wrapping the at least one wire around the core so as to be magnetically coupled thereto and around the polymeric protection members so as to be displaced from the sharp edges of the core.

10 52. The method of Claim 51 wherein the placing step is preceded by the step of placing an adhesive layer on an inner surface of the polymeric protection members, the adhesive layer securing the polymeric protection members to the core.

10 53. A method for fabricating a polymeric protection member for a device including a core having circumferentially extending sharp edges around an inner diameter and around an outer diameter thereof around which elongate members are wrapped, the method comprising:

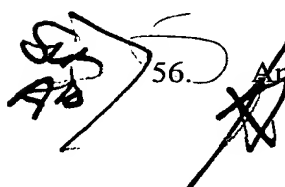
15 determining a circumferential length of one of the sharp edges;
measuring out a length of a polymeric protection strip stock corresponding to the determined circumferential length; and
cutting the polymeric protection strip stock to the measured length to provide the protection member, the polymeric protection strip stock being cut at an angle

20 selected to define mating angles at an overlapping region of the protection member when the cut protection member is wrapped around the core so as to extend around the entirety of one of the sharp edges of the core without a bump discontinuity at the overlapping region.

25 54. The method of Claim 53 wherein the angle comprises 45 degrees.

55. The method of Claim 53 wherein the polymeric protection strip stock has at least one short leg configured to be positioned adjacent at least one end of the core, wherein the short leg has a length selected to provide a substantially flat surface on the

30 end of the core when the polymeric protection member is wrapped around the core.

56.  An electromagnetic device comprising:

an electrically conductive core having at least one circumferentially extending sharp edge;

at least one polymeric protection member wrapped circumferentially around the core and positioned adjacent the at least one circumferentially extending sharp edge of the core, the at least one protection member further comprising a first end and a second end thereof, the first end and second end defining mating angles at an overlapping region of the at least one protection member when the protection member is wrapped around the core so as to extend around the entirety of the at least one circumferentially extending sharp edge of the core without a bump discontinuity at the overlapping region; and

an insulated wire wrapped around the core so as to be magnetically coupled thereto and around the at least one polymeric protection member so as to be displaced from the at least one circumferentially extending sharp edge of the core.

57. The device of Claim 56 wherein the mating angles are between about 15 degrees and about 75 degrees.

58. The device of Claim 57 wherein the at least one circumferentially extending sharp edge comprises a plurality of circumferentially extending sharp edges and wherein the at least one protection member comprises a plurality of protection members.

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